

Attorney's Docket No. K&A 00-0384
Client's Docket No. RST142CIP

APPLICATION

FOR UNITED STATES LETTERS PATENT

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT WE, **JOSEPH P. LIGOCI, SR.**, a
citizen of UNITED STATES OF AMERICA, **ELIAS J. GOLETSAS**,
a citizen of UNITED STATES OF AMERICA, have invented a new
and useful **FREQUENCY ACTIVATED NEUTRALIZING**
GENERATOR SYSTEM of which the following is a specification:

005160" ESTE9960

FREQUENCY ACTIVATED NEUTRALIZING GENERATOR SYSTEM

CROSS REFERENCE TO RELATED APPLICATION

5 This application is a continuation-in-part of Application No. 09/031,474, filed February 6, 1998. *which is now abandoned*

BACKGROUND OF THE INVENTION

Field of the Invention

10 The present invention relates to vehicular disabling systems and more particularly pertains to a new vehicle verifying and disabling system for disabling a vehicle attempting to elude law enforcement officials.

15 Description of the Prior Art

20 The use of vehicular disabling systems is known in the prior art. More specifically, vehicular disabling systems heretofore devised and utilized are known to consist basically of familiar, expected and obvious structural configurations, notwithstanding the myriad of designs encompassed by the crowded prior art which have been developed for the fulfillment of countless objectives and requirements.

25 Known prior art vehicular disabling systems include U.S. Patent No. 5,939,975, U.S. Patent No. 5,835,868, U.S. Patent 5,729,192, U.S. Patent No. 5,513,244, U. S. Patent No. 5,293,527; U.S. Patent No. 5,276,728; U.S. Patent No. 4,619,231; U.S. Patent
30 No. 4,878,050; U.S. Patent No. 5,398,190; and U.S. Patent Des.

337,066.

SUMMARY OF THE INVENTION

5 In view of the foregoing disadvantages inherent in the known types of vehicular disabling systems now present in the prior art, the present invention provides a new vehicle verifying and disabling system construction wherein the same can be utilized for disabling a vehicle attempting to elude law enforcement officials.

10 The general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new vehicle verifying and disabling system apparatus and method which has many of the advantages of the vehicular disabling systems
15 mentioned heretofore and many novel features that result in a new vehicle verifying and disabling system which is not anticipated, rendered obvious, suggested, or even implied by any of the prior art vehicular disabling systems, either alone or in any combination thereof.

20 To attain this, the present invention generally comprises a vehicle control unit for positioning in a vehicle. The vehicle control unit includes a transceiver for transmitting and receiving signals via free space. The transceiver is adapted to receive an
25 inquiry signal and transmit an identification code upon the receipt of the inquiry signal. A central database station includes memory for storing a plurality of identification codes of vehicle control units. An authorization code is associated in the memory with each of the identification codes of the vehicle control units. A mobile
30 law enforcement unit is provided for positioning in a law enforcement vehicle. The law enforcement unit includes a transceiver for transmitting and receiving signals via free space.

The law enforcement unit is adapted to transmit the inquiry signal to a vehicle control unit. The law enforcement unit is adapted to receive an identification code from the vehicle control unit and transmit the identification code to central database station. The
5 law enforcement unit is adapted to transmit the stop signal with the authorization code via free space to the vehicle control unit upon the receipt of the authorization code from the central database station.

10 There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that
15 will be described hereinafter and which will form the subject matter of the claims appended hereto.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is
20 not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and
25 terminology employed herein are for the purpose of description and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be
30 utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present

invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

5 Further, the purpose of the foregoing abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientists, engineers and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence
10 of the technical disclosure of the application. The abstract is neither intended to define the invention of the application, which is measured by the claims, nor is it intended to be limiting as to the scope of the invention in any way.

15 It is therefore an object of the present invention to provide a new vehicle verifying and disabling system apparatus and method which has many of the advantages of the vehicular disabling systems mentioned heretofore and many novel features that result in a new vehicle verifying and disabling system which is not
20 anticipated, rendered obvious, suggested, or even implied by any of the prior art vehicular disabling systems, either alone or in any combination thereof.

It is another object of the present invention to provide a new
25 vehicle verifying and disabling system which may be easily and efficiently manufactured and marketed.

It is a further object of the present invention to provide a new vehicle verifying and disabling system which is of a durable and
30 reliable construction.

An even further object of the present invention is to provide a

new vehicle verifying and disabling system which is susceptible of a low cost of manufacture with regard to both materials and labor, and which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such vehicle verifying and
5 disabling system economically available to the buying public.

Still yet another object of the present invention is to provide a new vehicle verifying and disabling system which provides in the apparatuses and methods of the prior art some of the advantages
10 thereof, while simultaneously overcoming some of the disadvantages normally associated therewith.

Still another object of the present invention is to provide a new vehicle verifying and disabling system for disabling a vehicle attempting to elude law enforcement officials.
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Even still another object of the present invention is to provide a new vehicle verifying and disabling system that includes a vehicle control unit for positioning in a vehicle. The vehicle
20 control unit includes a transceiver for transmitting and receiving signals via free space. The transceiver is adapted to receive an inquiry signal and transmit an identification code upon the receipt of the inquiry signal. A central database station includes memory for storing a plurality of identification codes of vehicle control
25 units. An authorization code is associated in the memory with each of the identification codes of the vehicle control units. A mobile law enforcement unit is provided for positioning in a law enforcement vehicle. The law enforcement unit includes a transceiver for transmitting and receiving signals via free space.
30 The law enforcement unit is adapted to transmit the inquiry signal to a vehicle control unit. The law enforcement unit is adapted to

receive an identification code from the vehicle control unit and transmit the identification code to central database station. The law enforcement unit is adapted to transmit the stop signal with the authorization code via free space to the vehicle control unit upon
5 the receipt of the authorization code from the central database station.

These together with other objects of the invention, along with the various features of novelty which characterize the invention,
10 are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred
15 embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than
20 those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIGURE 1 is a schematic overview of the operation of the
25 system of the present invention.

FIGURE 2 is a schematic perspective view of the Law Enforcement Unit (LEU) of the invention.

30 FIGURE 3 is a schematic block diagram of the Vehicle Control Unit (VCU).

FIGURE 4 is a schematic block diagram of the Law

Enforcement Unit of the invention.

FIGURES 5A and 5B are flow diagrams of the operation of the Vehicle Control Unit (VCU).

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FIGURE 6 is a flow diagram of the operation of the Law Enforcement Unit (LEU) and the Central Station Computer (CSC).

FIGURE 7 is a flow diagram of the operation of the Central Station Computer (CSC).

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the drawings, and in particular to Figures 1 through 7 thereof, a new vehicle verifying and disabling system embodying the principles and concepts of the present invention and generally designated by the reference numeral 10 will be described.

The present invention allows a law enforcement officer to remotely disable and enable a suspect vehicle, such as an automobile, boat, snowmobile, motorcycle, aircraft, and any other motor vehicle.

A police vehicle 1 is shown to be equipped with a standard Mobile Police Computer 5 which is interfaced through a serial port to the Law Enforcement Unit (LEU) module 4 which includes a directional antenna 3 (see FIG. 1). When the law enforcement officer sees a suspect vehicle 2 behaving erratically or breaking the law, he presses the INQUIRE button 100 (see FIG. 2) on his LEU module 4. This causes the LEU to transmit an INQUIRY signal 8 to the Vehicle Control Unit (VCU) 9 in the suspect vehicle 2. Upon receipt of the INQUIRY signal 8, the VCU 9 returns an ID code of

the suspect vehicle 2. The LEU relays the ID code to the Central Station Computer 6 using the existing link 7 between the Mobile Police Computer 5 and the Central Station Computer 6. The Central Station Computer looks up the ID code in a Hot Sheet Database, a Motor Vehicle Database, a Vehicle Authorization Database and any other appropriate databases and transmits the Vehicle Authorization Code 106 (which is used as a password to control the suspect vehicle 2) to the Mobile Police Computer which relays the Vehicle Authorization Code to the LEU which uses the code with the INQUIRY and STOP commands to stop the suspect vehicle.

Security is maintained by encrypting the Vehicle Authorization Code in nonvolatile Random Access Memory (RAM) 9 on the VCU at the time it is installed in the vehicle. This Vehicle Authorization Code is the same one that is stored on the Central Station Computer in a large database for all VCUs (and the associated vehicle) manufactured. The data transmission between the suspect vehicle 2 and the police vehicle 1 as well as data transmission between the police vehicle and the Central Station Computer 6 is encrypted using private key methods to ensure the security of the entire data stream. Theft of an LEU or an LEU and a VCU does not violate the security of the system because the actual Vehicle Authorization Codes reside only on the Central Station Computer 6 database in contrast to other known systems which use algorithmically-derived authorization codes.

A preferred VCU module 4 (see FIG. 2) includes the INQUIRE, STOP and RESET buttons of the module. The module 4 is the interface between the law enforcement officer and the LEU 4. When a suspect vehicle is behaving erratically or breaking the law, the officer first presses the INQUIRE button 100, and the INQUIRE

The VCU is made up of a programmable logic controller 17 linked to a transceiver 16 and an antenna 31. The power supply 21 draws power from the vehicle's battery. Control of the vehicle is gained through the emergency flasher control 20, the horn controls 19, and depending if the VCU is installed on a new vehicle in the factory or if it is installed in a used vehicle as a retrofit, there are different controls 40 for each. In new vehicles, the serial data line and the command line 29 of the PLC communicate with the vehicle's Powertrain Control Module (PCM) 30. The serial data line is an encrypted digital pulse train that the vehicle Powertrain Control Module (PCM) looks for at all times. The loss of the signal will cause the vehicle to return to idle and illuminate the check engine light of the vehicle as an anti-tamper feature. The command line signal is an analog or digital signal to the PCM, which will return the vehicle to idle. The command line can be enabled by a command from the LEU or by the owner of the vehicle, using a keypad access code. The retrofit controls are the tachometer sensor 23, the PRNDL switch 24, the Brake On/Off (BOO) switch 25, the Throttle Position Sensor 26, the Vehicle Load Sensor (VLS) 27, and the Vehicle Speed Sensor 28. The tachometer sensor 23 produces an analog or digital signal representing the engine speed in revolutions per minute. The lowest tachometer signal captured during the snapshot phase. The PRNDL switch 24 produces an analog or digital signal identifying the gear position of the vehicle (i.e., Park, Reverse, Neutral, Drive, or Low gear), and is also used as a necessary condition to be met prior to the snapshot being taken. The BOO switch 25 produces an analog signal that confirms vehicle brake application (e.g., pressing on the brake pedal), and is used as one of the conditions that must be met before the learning processor 22 snapshots the TPS (throttle position sensor) 26 and the

Load Sensor 27. The throttle position sensor 26 produces an analog or digital signal representing the vehicle operator's acceleration intentions. The Vehicle Load Sensor 27 produces an analog or digital representation of the load placed on the engine, and may measure airflow in grams per second or in engine vacuum (e.g., absolute pressure). The vehicle speed sensor (VSS) 28 produces an analog or digital signal representing vehicle speed and may be used in conjunction with, or in place of, the signal of the BOO sensor 25, and this will be critical in determining the at rest, in gear parameters of the Throttle Position Sensor 26 and the Engine Load Sensor 27. All of these retrofit items feed into the learning processor 22 portion of the PLC 17. The Learning Processor 22 takes a snapshot view at different instances of the vehicle's operation. Once the Learning Processor 22 has acquired enough data regarding the vehicle's sensor levels, the PLC 17 can communicate with the vehicle's Powertrain Control Module 30, and can idle the vehicle once enabled.

A preferred Law Enforcement Unit (LEU) is shown in FIG. 4. The LEU is made up of a Programmable Logic Controller 12 linked to a transceiver 11, an antenna 10, and a power supply 15 to feed the entire circuit. The LEU communicates with the Mobile Police Computer via an Input/Output Port 13 and interfaces with the computer 5 shown in Figure 1.

The operation of the vehicle control unit (VCU) is illustrated in FIG. 5. After the unit is powered on (box 50), the unit goes into a wait state (box 52). Upon reception of an Inquiry Command (box 54), the system transmits the vehicle ID code to the LEU. The VCU will wait up to 30 seconds after the Inquiry Command for the authorization code to be sent by the LEU to the VCU as a "lock-on"

acknowledgement (box 56). If a valid authorization code is received (box 58), the vehicle's flasher lights (e.g., the turn signals lights) are turned on (box 60) and the VCU will wait for a STOP or RESET command. If no command is received, or a RESET

5 command is received, the flashers are turned off (box 64) and the system is RESET to an initial state. If a STOP command is received, then the vehicle is put into an idle state. This will cause the vehicle to coast to a stop. The horn may be activated in an oscillatory fashion (e.g., turned on and off in approximately 1

10 second intervals). When an R1 (First Reset) command is received (box 68), the horn is turned off (box 70) to allow the officer to question the driver. When an R2 (Second Reset) command is received (box 72), the system is reset and the vehicle is again fully operational (box 73).

15 After power up (see FIG. 6) of the LEU module, the LEU module for waits for serial authorization code (box 75) from the Mobile Police Computer 5 (which may be solicited from various combinations of inputs, e.g., swipe card, pin number, fingerprint

20 sensor, retinal scan). If data is received (box 76), then the local authorization code is stored in the LEU chip is compared with the received authorization code and validated (box 80). If the authorization code is proper, then the user interface is started, and awaits commands (box 82) from the LEU module. Upon receipt of

25 an INQUIRE command, the LEU sends an ID code from the Vehicle Control Unit (of the suspect vehicle) to the Central Station Computer 6 and waits for the Vehicle Authorization Code to be sent back over a secure interface from the Central Station Computer

30 (box 86). If the vehicle has already been acquired, the flashers of the vehicle will already be blinking (box 94), and the LEU will switch to another vehicle (e.g., the next closest vehicle in signal

strength) as the current vehicle (box 96). Otherwise, it will select the closest vehicle as the current vehicle 98. Then the INQUIRY command with authorization code will be sent to the suspect vehicle (box 110) to actually "lock on" and start the flashers of the suspect vehicle flashing. The LEU will rescan the current area and update the list of vehicles in range (box 112). Within 30 seconds, the system will wait for a status return from the suspect vehicle's LEU to acknowledge that the system has indeed been acquired (box 114). Based on that response, the system's state will be updated (box 116) and a voice status message will be played (box 118).

An additional software module (see FIG. 7) may be required at the Central Station Computer 6 to process authorization checks from the various LEUs, and simultaneously screen the ID code of the vehicle and the operator of the vehicle for violations. Upon initiation (box 120), the software opens the appropriate databases (box 121) and communication links (box 122) to the wireless network in waits for an ID code check request (box 124). Upon reception of an ID code (box 126), the code number is located in the appropriate databases (box 132) and the Vehicle Authorization Code and other pertinent information is transmitted back to the requesting Mobile Police Computer (box 134) and an audit trail is created (box 136). The computer program may be terminated for maintenance purposes or other reasons (boxes 128, 130).

The data sent back to the requesting law enforcement patrol can be such information as: a stolen vehicle automated "HOT SHEET" scan, an operator description/warrant check, a visual check to match license plate with automated license plate information and a check of vehicle registration information.

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Possible uses of the present invention includes rental fleets, corporate fleets, police vehicles, commercial vehicles, and vehicles in urban, high-theft-rate areas. Governments could require mandatory use for drivers with D.W.I. records. Insurance companies would be motivated to give discounts to customers who have the present invention installed on their vehicles, because this would diminish the chances of auto theft and auto damage claims due to accidents in high-speed chases. Foreign governments with societies that are more restrictive than the U.S. might require the device for all newly manufactured vehicles (i.e., Singapore).

As to a further discussion of the manner of usage and operation of the present invention, the same should be apparent from the above description. Accordingly, no further discussion relating to the manner of usage and operation will be provided.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the

scope of the invention.

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